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Thai

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(54) **BUBBLE GENERATING ASSEMBLY**

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(73) Assignee: **Arko Development Limited** (HK)

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(22) Filed: **Jul. 15, 2002**

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(63) Continuation-in-part of application No. 10/133,195, filed on Apr. 26, 2002, which is a continuation-in-part of application No. 10/099,431, filed on Mar. 15, 2002.

(51) **Int. Cl.**[7] **A63H 33/28**
(52) **U.S. Cl.** **446/15**; 446/20; 446/484
(58) **Field of Search** 446/15–21, 475, 446/484

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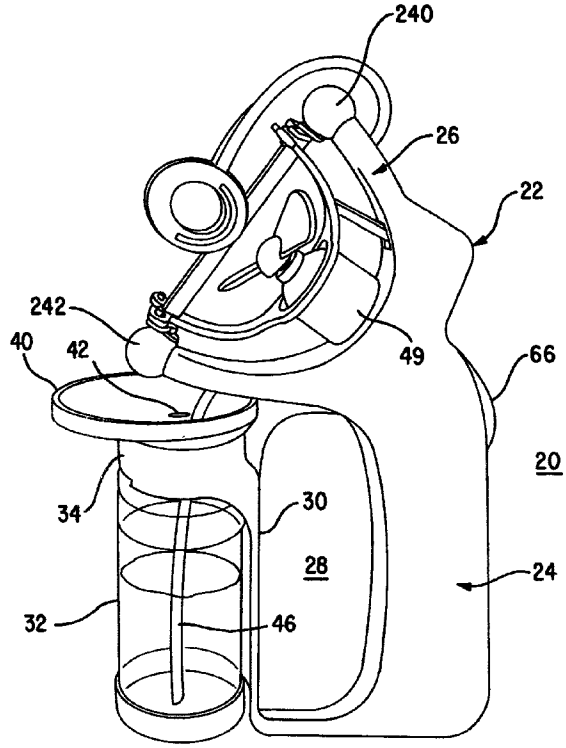
(57) **ABSTRACT**

A bubble generating assembly has a housing, a container coupled to the housing and retaining bubble solution, a trigger mechanism, a pair of bubble generating rings, a tubing that couples the interior of the container with the rings, and a link assembly that couples the trigger mechanism and the rings in a manner in which actuation of the trigger mechanism causes the rings to be pivoted. Each ring is pivotably coupled to each other in a manner such that the rings can be pivoted between a closed position where the front surfaces of the rings contact each other, and an opened position where the rings are positioned side-by-side in the same plane.

30 Claims, 12 Drawing Sheets



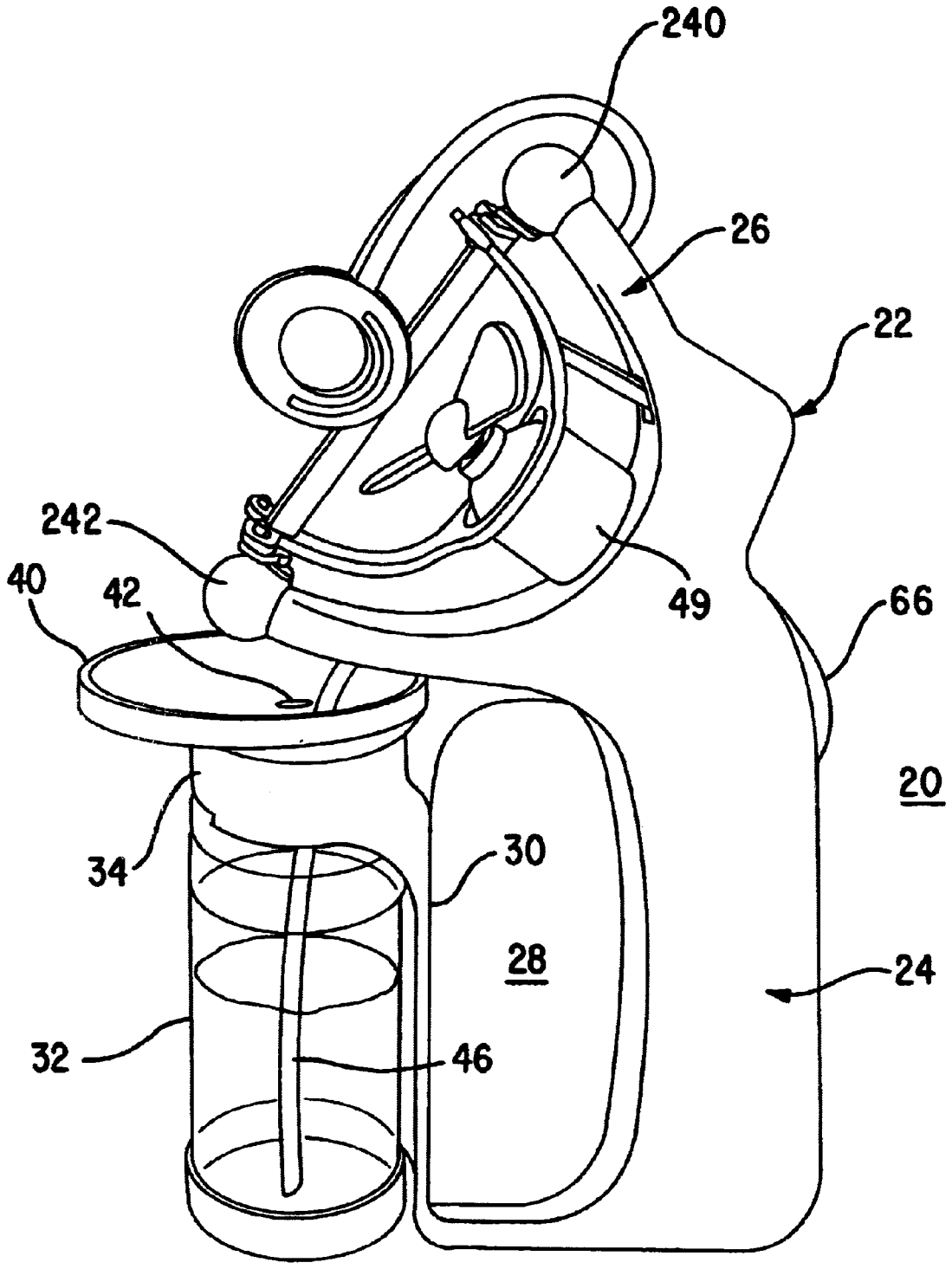


FIG. 1

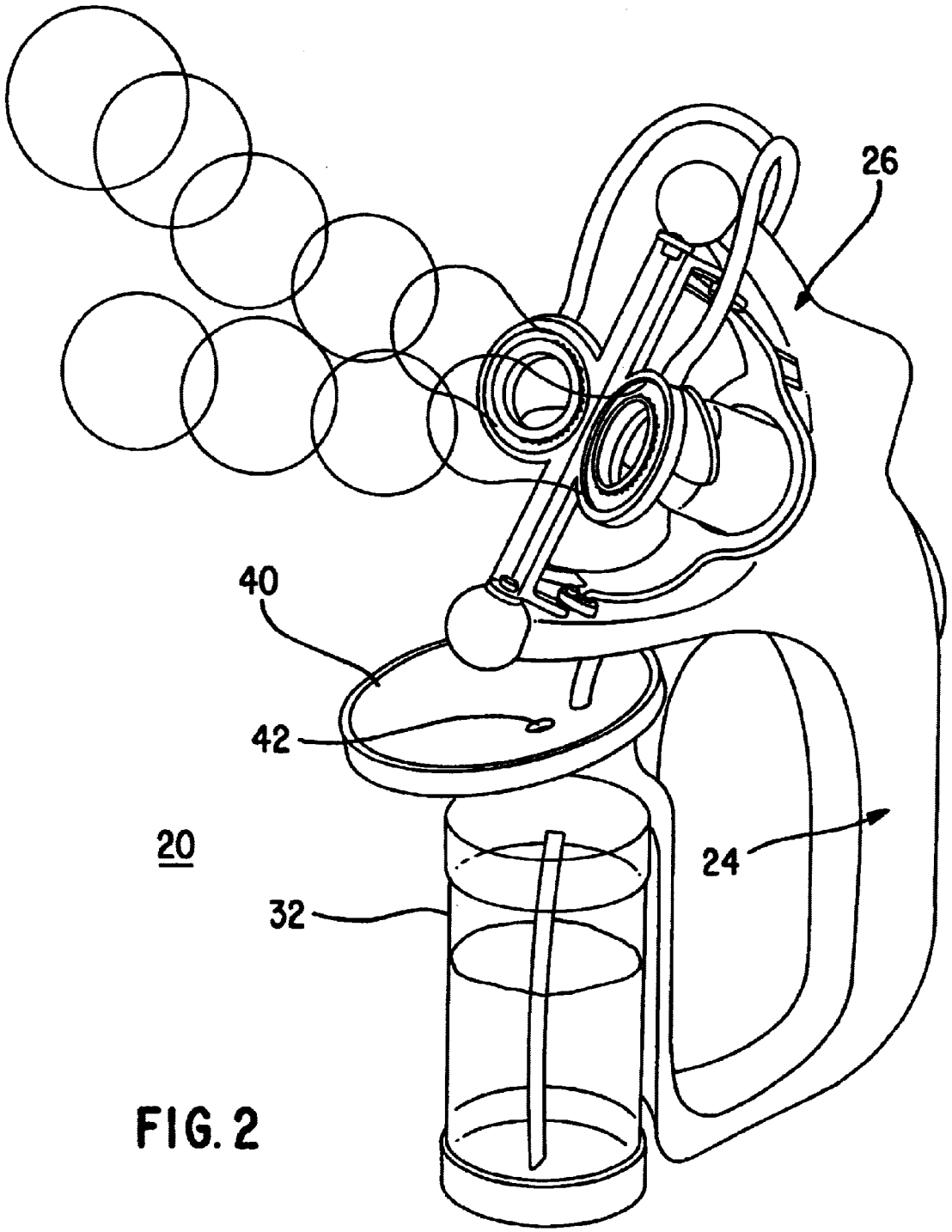


FIG. 2

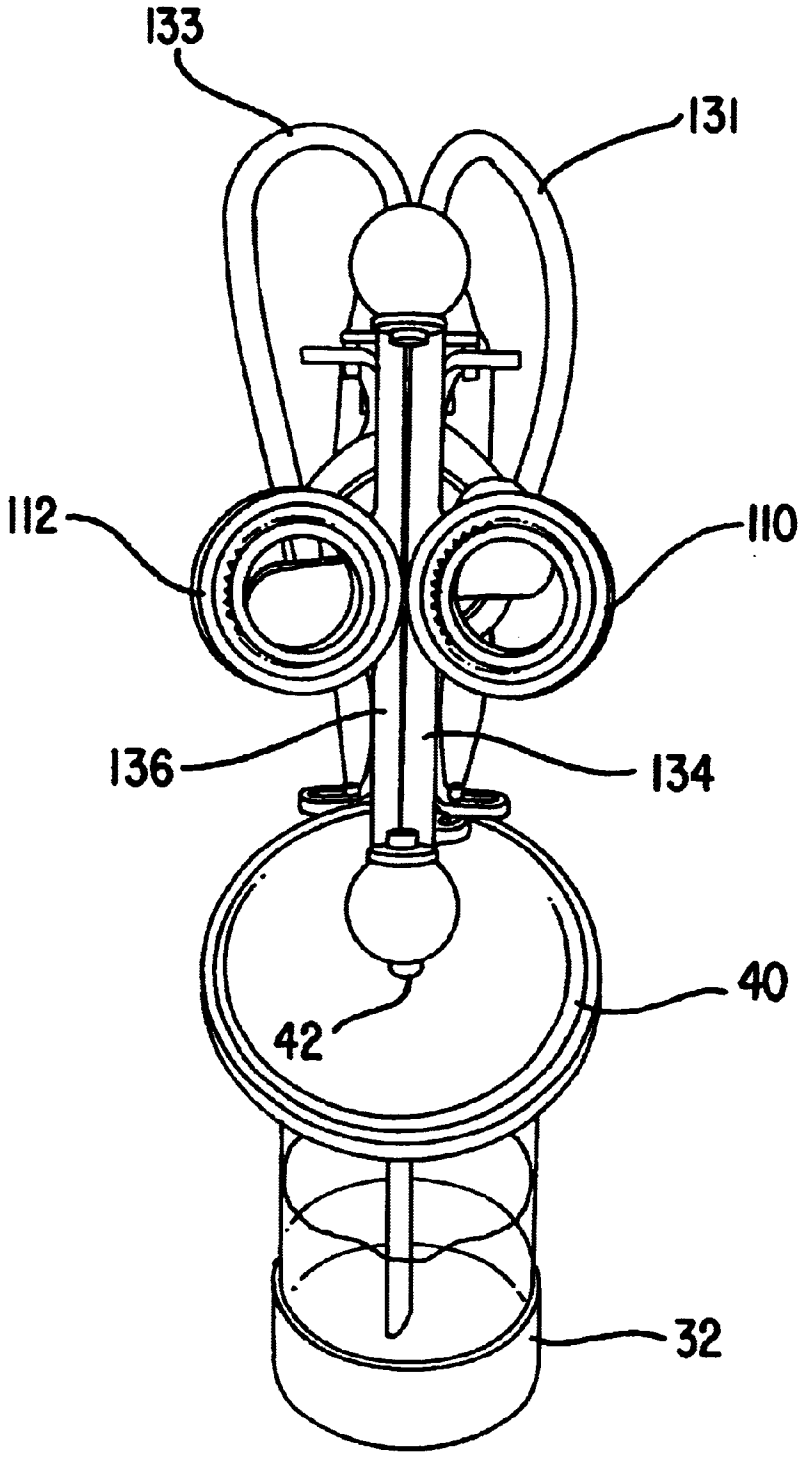


FIG. 3

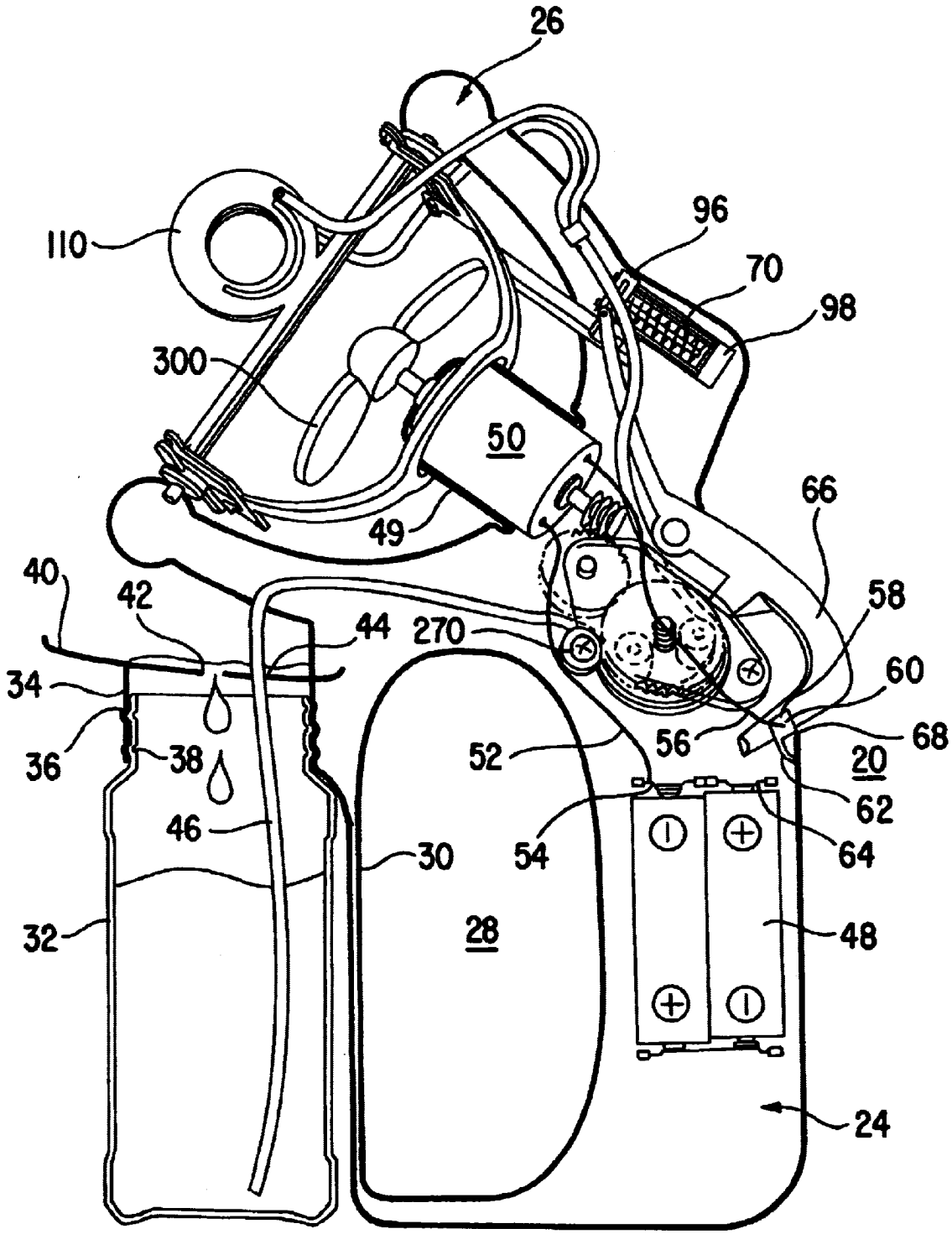

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FIG. 4

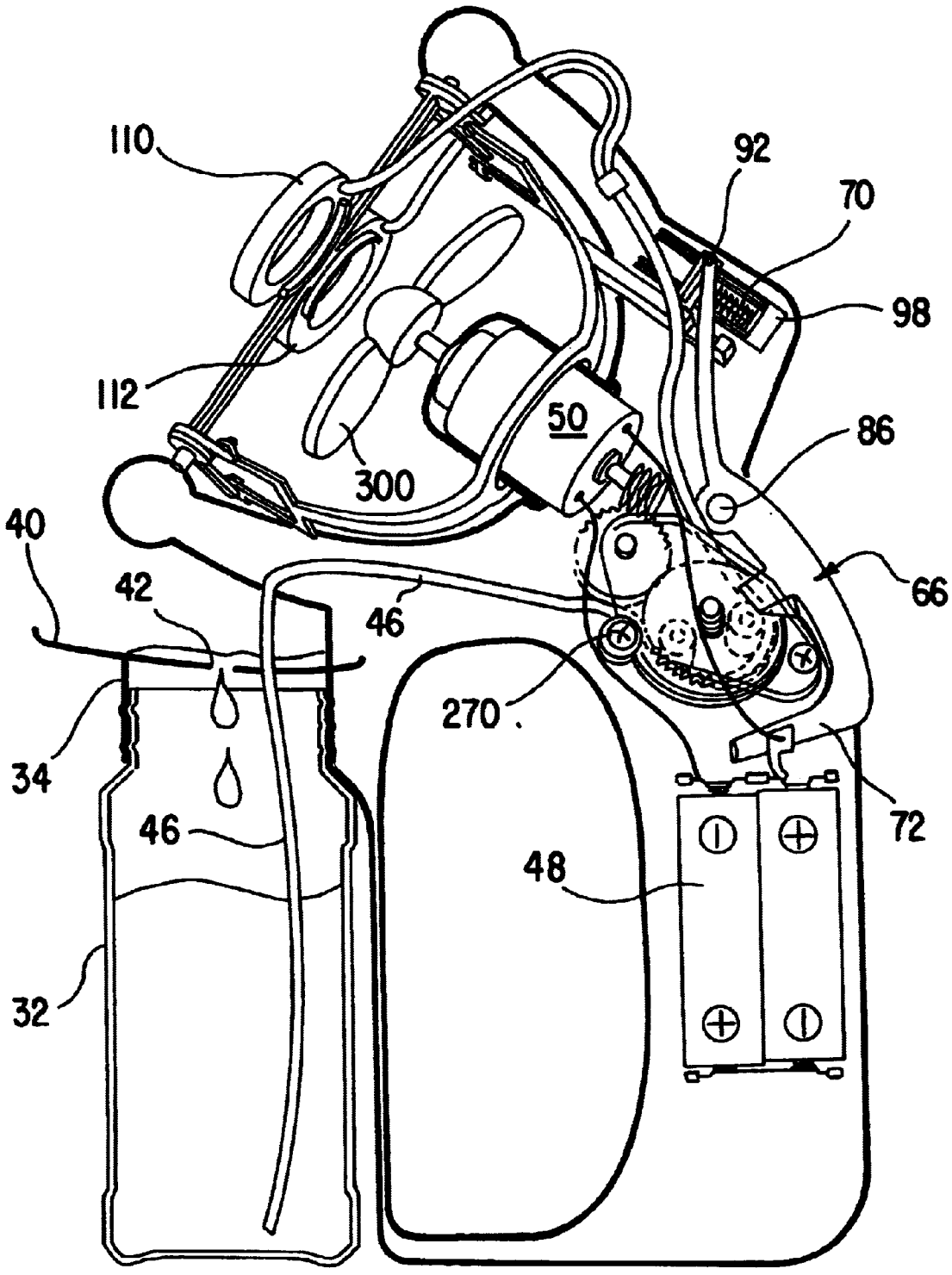

FIG. 5

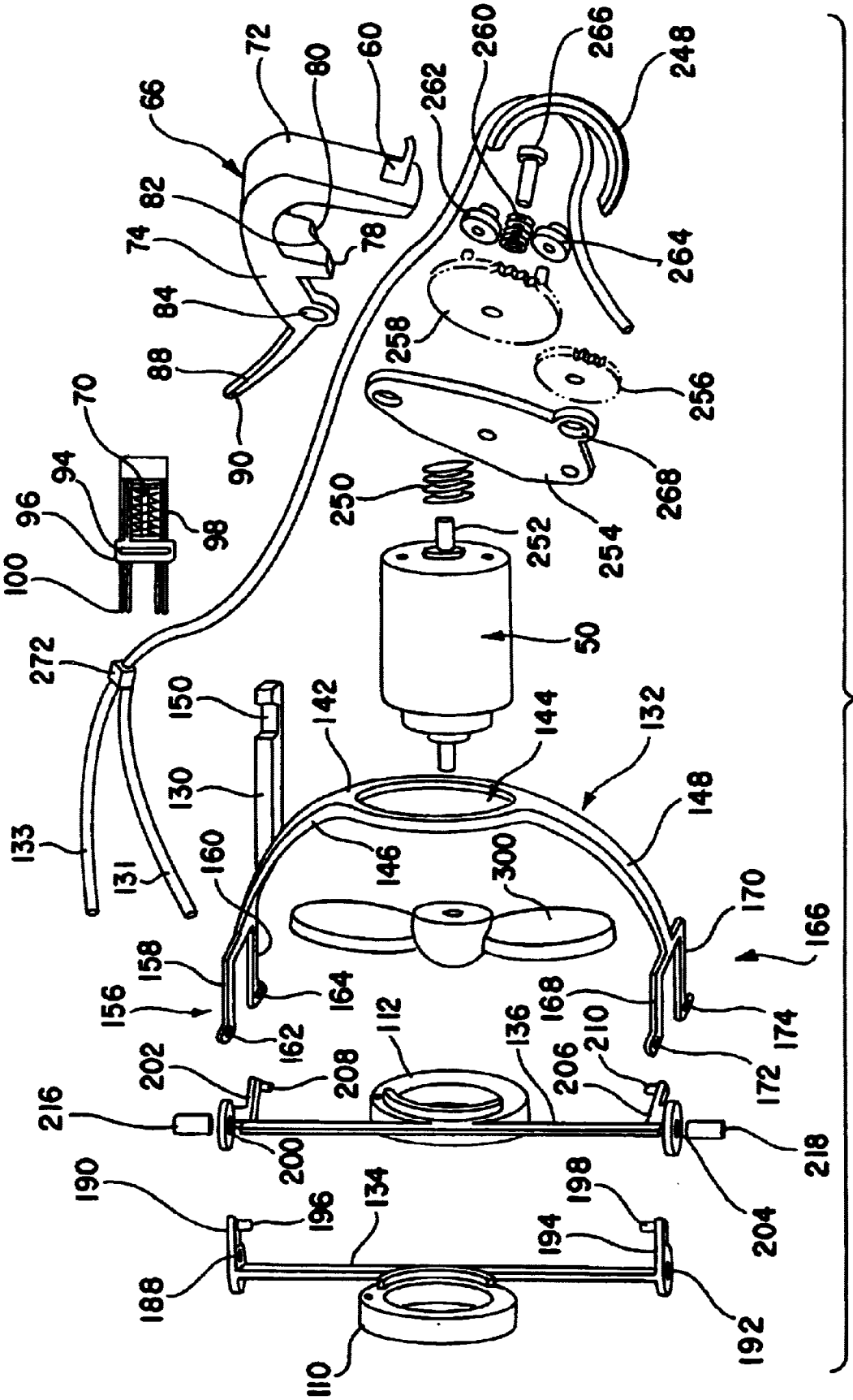
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FIG. 6

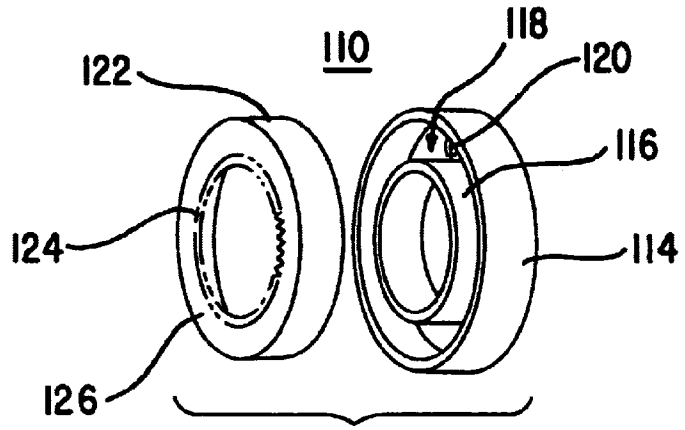


FIG. 7

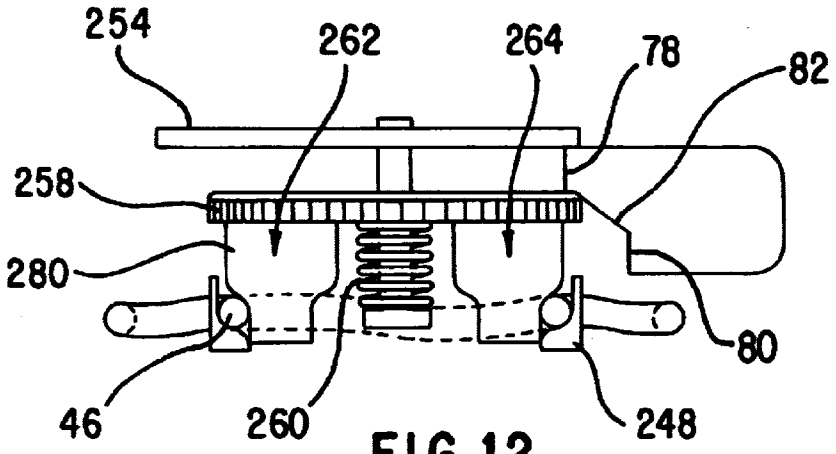


FIG. 12

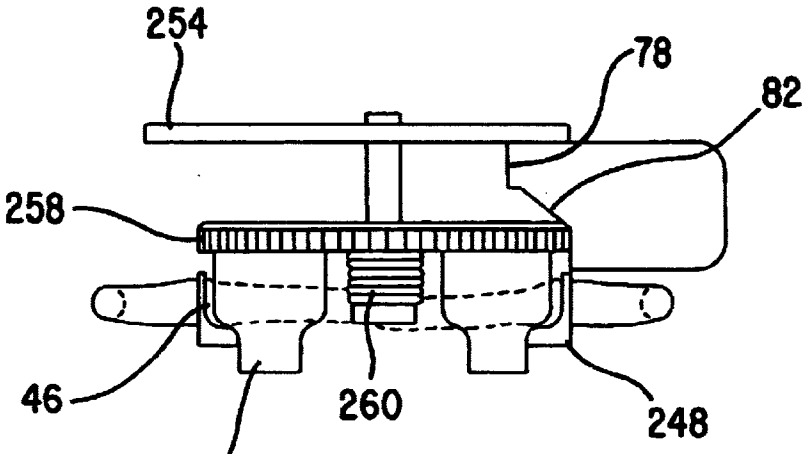
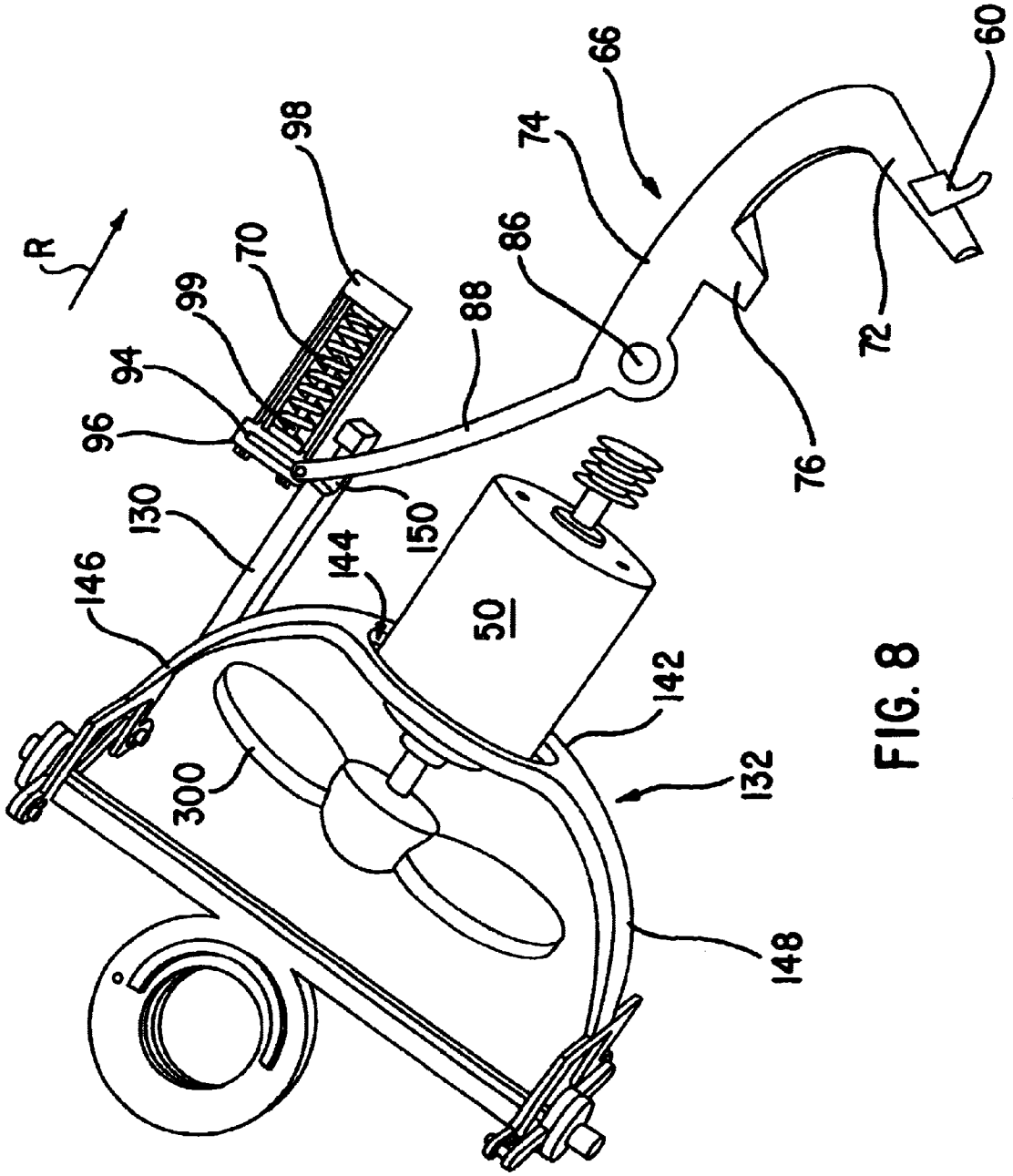


FIG. 13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99
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142
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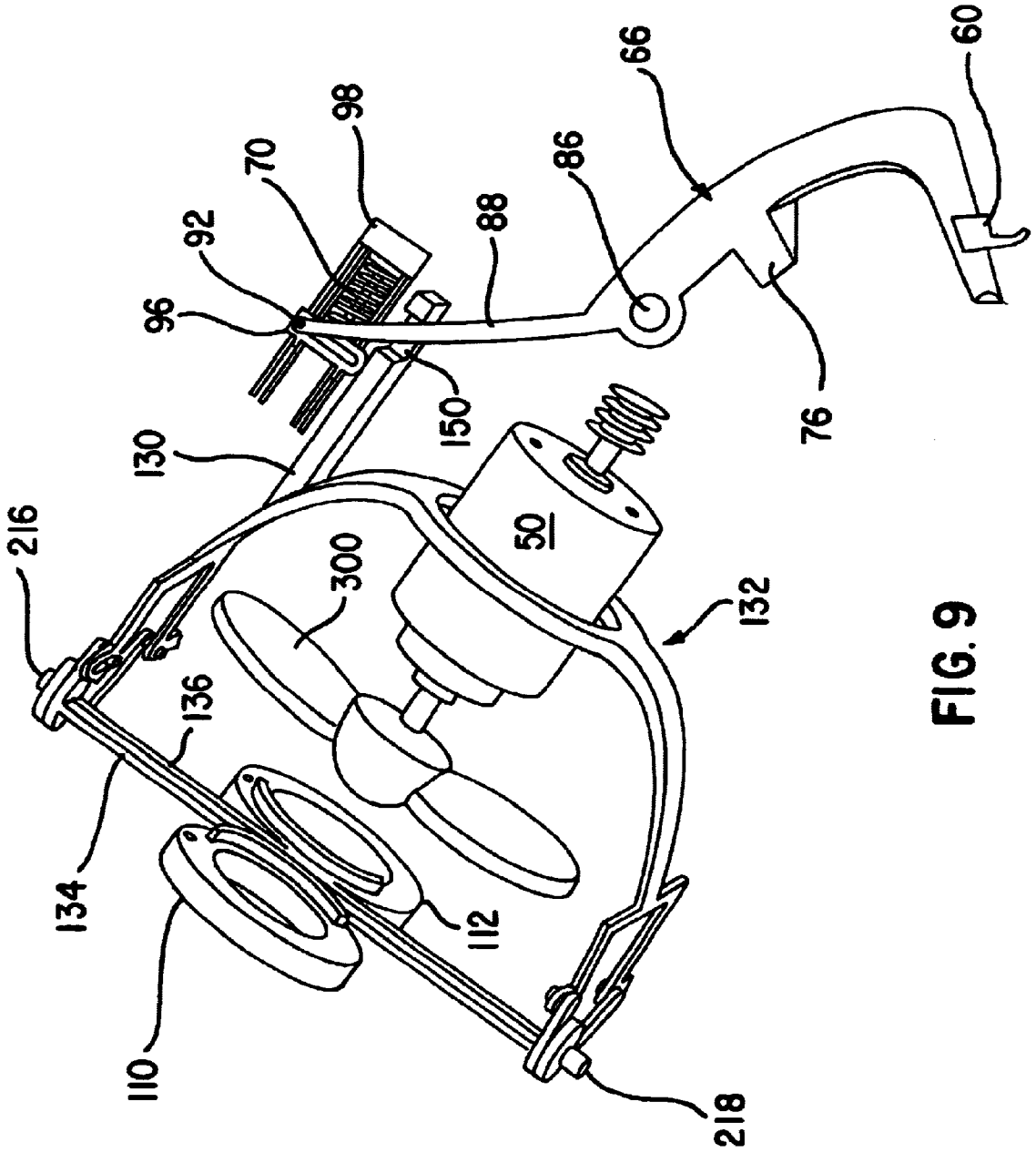
FIG. 8


60
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216
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218

FIG. 9

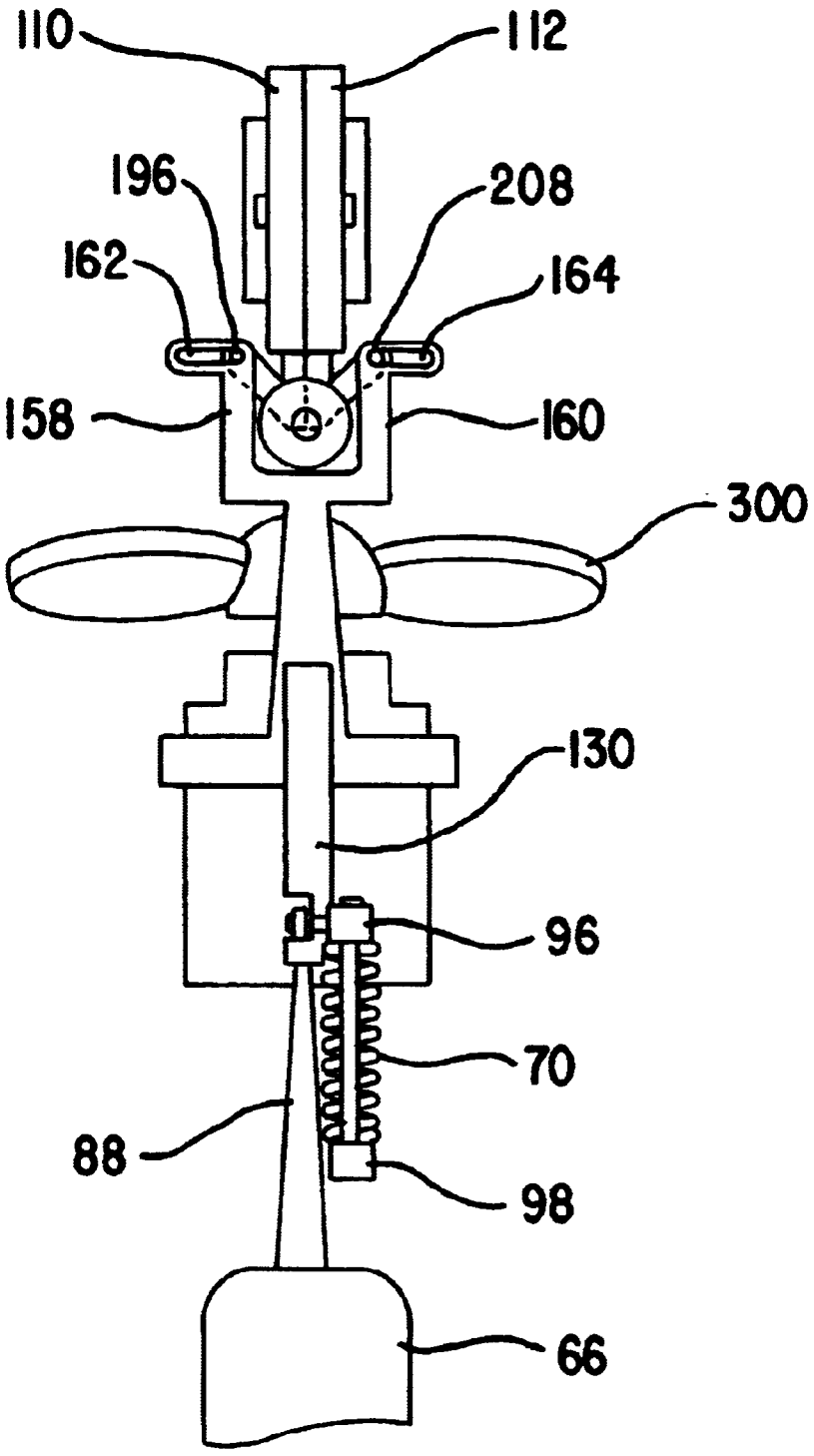


FIG. 10

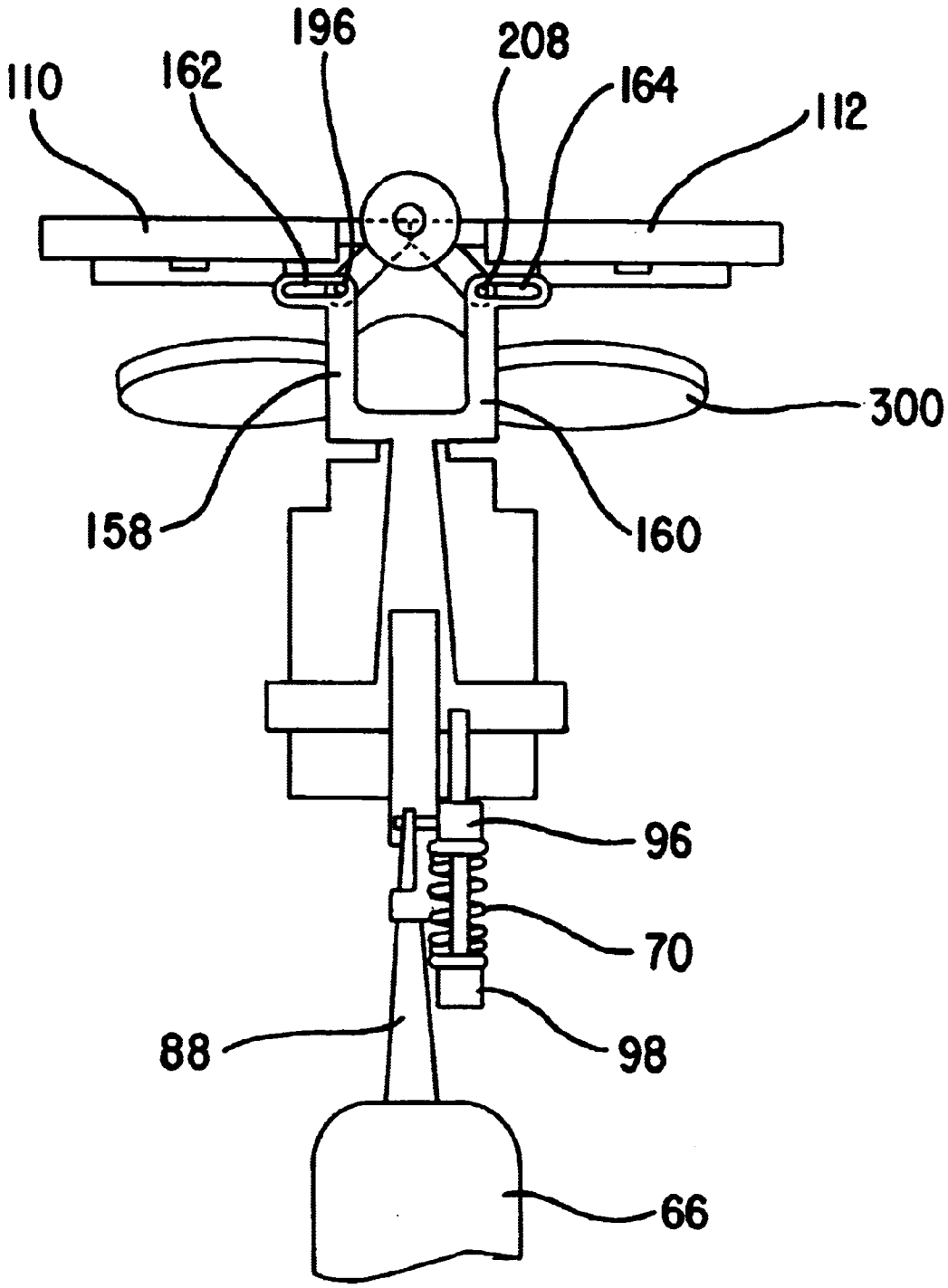
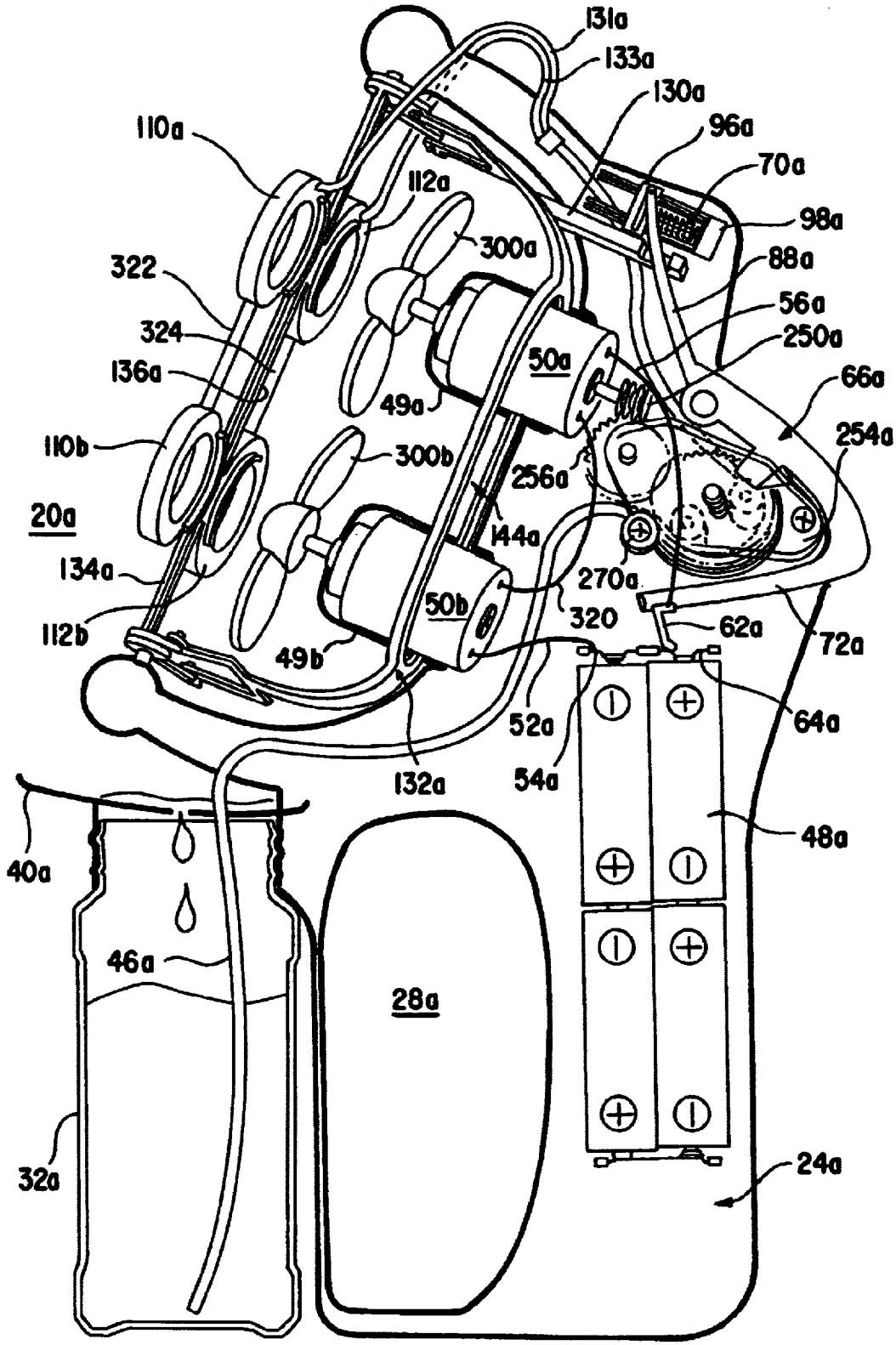


FIG. 11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322
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56a
324
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50a
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49a
110b
254a
300b
256a
20a
144a
134a
270a
50b
320
62a
112b
72a
49b
52a
64a
54a
132a
48a
40a
46a
28a
32a
24a

FIG. 14

BUBBLE GENERATING ASSEMBLY

RELATED CASES

This is a continuation-in-part of Ser. No. 10/133,195, entitled "Apparatus and Method for Delivering Bubble Solution to a Dipping Container", filed Apr. 26, 2002, which is in turn a continuation-in-part of Ser. No. 10/099,431, entitled "Apparatus and Method for Delivering Bubble Solution to a Dipping Container", filed Mar. 15, 2002, whose disclosures are incorporated by this reference as though fully set forth herein.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to bubble toys, and in particular, to a bubble generating assembly which automatically forms a bubble film over a bubble ring without the need to dip the bubble ring into a container or a dish of bubble solution.

2. Description of the Prior Art

Bubble producing toys are very popular among children who enjoy producing bubbles of different shapes and sizes. Many bubble producing toys have previously been provided. Perhaps the simplest example has a stick with a circular opening or ring at one end, resembling a wand. A bubble solution film is produced when the ring is dipped into a dish that holds bubble solution or bubble producing fluid (such as soap) and then removed therefrom. Bubbles are then formed by blowing carefully against the film. Such a toy requires dipping every time a bubble is to created, and the bubble solution must accompany the wand from one location to another.

Recently, the market has provided a number of different bubble generating assemblies that are capable of producing a plurality of bubbles. Examples of such assemblies are illustrated in U.S. Pat. No. 6,149,486 (Thai), U.S. Pat. No. 6,331,130 (Thai) and U.S. Pat. No. 6,200,184 (Rich et al.). The bubble rings in the bubble generating assemblies in U.S. Pat. No. 6,149,486 (Thai), U.S. Pat. No. 6,331,130 (Thai) and 6,200,184 (Rich et al.) need to be dipped into a dish that holds bubble solution to produce films of bubble solution across the rings. The motors in these assemblies are then actuated to generate air against the films to produce bubbles.

All of these aforementioned bubble generating assemblies require that one or more bubble rings be dipped into a dish of bubble solution. In particular, the child must initially pour bubble solution into the dish, then replenish the solution in the dish as the solution is being used up. After play has been completed, the child must then pour the remaining solution from the dish back into the original bubble solution container. Unfortunately, this continuous pouring and re-pouring of bubble solution from the bottle to the dish, and from the dish back to the bottle, often results in unintended spillage, which can be messy, dirty, and a waste of bubble solution.

Thus, there remains a need to provide an apparatus and method for forming a film of bubble solution across a bubble ring without the need to dip the bubble ring into a dish of bubble solution.

SUMMARY OF THE DISCLOSURE

It is an object of the present invention to provide an apparatus and method for effectively forming a film of bubble solution across a bubble ring.

It is another object of the present invention to provide an apparatus and method for effectively forming a film of bubble solution across a bubble ring in a manner which minimizes spillage of the bubble solution.

It is yet another object of the present invention to provide an apparatus having a simple construction that effectively forms a film of bubble solution across a bubble ring.

It is yet a further object of the present invention to provide an apparatus and method for effectively forming films of bubble solution across a plurality of bubble rings.

The objectives of the present invention are accomplished by providing a bubble generating assembly having a housing, a container coupled to the housing and retaining bubble solution, a trigger mechanism, a pair of bubble generating rings, a tubing that couples the interior of the container with the rings, and a link assembly that couples the trigger mechanism and the rings in a manner in which actuation of the trigger mechanism causes the rings to be pivoted. Each ring is pivotably coupled to each other in a manner such that the rings can be pivoted between a closed position where the front surfaces of the rings contact each other, and an opened position where the rings are positioned side-by-side in the same plane.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a bubble generating assembly according to one embodiment of the present invention shown with the two bubble rings contacting each other.

FIG. **2** is another perspective view of the assembly of FIG. **1** shown with the two bubble rings positioned side by side with each other.

FIG. **3** is a front view of the assembly of FIG. **1** shown with the two bubble rings positioned side by side with each other.

FIG. **4** is a cross-sectional view of the assembly of FIG. **1** shown with the two bubble rings contacting each other.

FIG. **5** is a cross-sectional view of the assembly of FIG. **1** shown with the two bubble rings positioned side by side with each other.

FIG. **6** is an exploded view illustrating the internal components of the assembly of FIG. **1**.

FIG. **7** is an exploded view of a bubble ring that can be used with the assembly of FIG. **1**.

FIG. **8** is an isolated and enlarged perspective view of the link system of the assembly of FIG. **1** shown with the two bubble rings contacting each other.

FIG. **9** is an isolated and enlarged perspective view of the link system of the assembly of FIG. **1** shown with the two bubble rings positioned side by side with each other.

FIG. **10** is an isolated and top plan view of the link system of the assembly of FIG. **1** shown with the two bubble rings contacting each other.

FIG. **11** is an isolated and top plan view of the link system of the assembly of FIG. **1** shown with the two bubble rings positioned side by side with each other.

FIG. **12** is an isolated top plan view illustrating the relationship between the pressure rollers and the tube when the assembly of FIG. **1** is in the normal non-perational condition.

FIG. **13** is an isolated top plan view illustrating the relationship between the pressure rollers and the tube when the assembly of FIG. **1** is in the bubble-generating position.

FIG. **14** is a cross-sectional view of a bubble generating assembly according to another embodiment of the present invention shown with the two sets of bubble rings positioned side by side with each other.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The following detailed description is of the best presently contemplated modes of carrying out the invention. This description is not to be taken in a limiting sense, but is made merely for the purpose of illustrating general principles of embodiments of the invention. The scope of the invention is best defined by the appended claims. In certain instances, detailed descriptions of well-known devices and mechanisms are omitted so as to not obscure the description of the present invention with unnecessary detail.

FIGS. **1–13** illustrate one embodiment of a bubble generating assembly **20** according to the present invention. The assembly **20** has a housing **22** that includes a bottom or handle section **24** and an upper or bubble generating section **26**. The housing **22** can be provided in the form of two symmetrical outer shells that are connected together by, for example, screws or welding or glue. These outer shells together define a hollow interior for housing the internal components of the assembly **20**, as described below. The handle section **24** has an opening **28** through which a user can extend his or her fingers to grip the handle section **24**. The front wall **30** of the opening **28** defines a shielding wall against which a conventional bubble solution bottle **32** can be rested. The bubble solution bottle **32** can be provided in the form of any of the conventional bubble solution containers that are currently available in the marketplace. A connecting section **34**, which resembles an annular wall, extends from the front of the top of the front wall **30**, and has internal threads **36** (see also FIGS. **4** and **5**) that are adapted to releasably engage the external threads **38** on the neck of the solution bottle **32**. A solution dish **40** is secured to the top of the connecting section **34**, and has a first opening **42** that communicates with the interior of the connecting section **34**. The dish **40** also has a second opening **44** that communicates with the interior of the connecting section **34**, and which receives a tube **46** that extends therethrough from the solution bottle **32** to the bubble generating section **26**.

The handle section **24** houses a power source **48** which can include at least one conventional battery. The bubble generating section **26** has a motor housing **49** that houses a motor **50** that is electrically coupled to the power source **48** via a first wire **52** and a first electrical contact **54**. A second wire **56** couples the motor **50** to a first end **58** of a second electrical contact **60**, whose second curved end **62** is adapted to releasably contact a third electrical contact **64** that is coupled to the power supply **48**. The second contact **60** is attached to the bottom leg **72** of a push button **66**, which operates as a trigger mechanism.

The push button **66** is positioned at a rear side of the housing **22** between the handle section **24** and the bubble generating section **26**, and extends through an opening **68** in the housing **22**. Referring also to FIG. **6**, the push button **66** has a generally L-shaped configuation with a bottom leg **72** and an elongated leg **74**. A stepped extension **76** extends from the inner side of the elongated leg **74**, and has a lower edge **78** and an upper edge **80** that are connected by an angled edge **82**. The top end of the elongated leg **74** has a pivot opening **84** that receives a pivot shaft **86** (see FIGS. **4** and **5**). A curved bar **88** extends from the top end of the elongated leg **74**, and has a pivot opening **90** at its terminal end that receives a sliding shaft **92** (see FIGS. **4**, **5**, **8** and **9**). The sliding shaft **92** is retained for reciprocating sliding movement inside a straight groove **94** of a locking piece **96** that is sleeved over a locking rack **98** (see also FIGS. **8–11**). A shaft **99** (see FIG. **8**) is attached to the locking piece **96** and extends in the interior of the locking rack **98**, and a resilient element **70** (such as a spring) is retained over the shaft **99**. The resilient element **70** normally biases the locking piece **96** towards a forward end **100** of the locking rack **98**. As the locking piece **96** moves back and forth along the outer surface of the locking rack **98**, the sliding shaft **92** slides up and down along the groove **94** (compare FIGS. **8** and **9**) in a direction perpendicular to the direction of movement of the locking piece **96**. The push button **66** is normally biased outwardly away from the housing **22** by the resilient element **70** which biases the locking piece **96** towards the forward end **100** of the locking rack **98**. This causes the sliding shaft **92** to slide downwardly (see FIGS. **4** and **8**) in the groove **94**, which causes the bar **88** and the push button **66** to pivot in a counter-clockwise direction (as viewed from the orientation of FIGS. **4** and **5**) about the pivot shaft **86**, biasing the push button **66** outwardly away from the housing **22**. As a result, the bias of the push button **66** means that the second contact **60** carried on the push button **66** is also normally biased away from the third contact **64** so that the motor **50** is not powered by the power source **48** under normal (non-operation) circumstances.

A pair of bubble generating rings **110** and **112** are provided outside the housing **22**, and are adapted to be moved between a closed position (see FIGS. **1**, **4** and **8**), in which the front surfaces **126** of both rings **110**, **112** contact each other, to an opened position (see FIGS. **2**, **5** and **9**), in which the rings **110**, **112** are positioned side-by-side in the same plane. Each ring **110** and **112** can be identical in structure and operation, so only one ring **110** is illustrated in FIG. **7**. The ring **110** has an annular base piece **114** that has a cylindrical wall **116** extending therein to define an annular chamber **118** therein. An opening **120** is provided in the base piece **114**. The ring **110** also has an annular cover piece **122** that fits into the annular chamber **118** of the base piece **114**. A plurality of outlets **124** can be provided along the inner annular surface, and/or the front surface **126**, of the cover piece **122**. Respective tubings **131** and **133** (see FIG. **6**) are attached to the opening **120** of each ring **110**, **112**, to deliver bubble solution from the solution bottle **32** via the tube **46** into the chambers **118** of the respective rings **110**, **112**. The bubble solution from the chambers **118** can then leak out of the outlets **124** onto the front surface **126** of the rings **110**, **112**. When the bubble rings **110**, **112** are in their normal non-operating (i.e., closed) position, the contact between the front surfaces **126** of the bubble rings **110**, **112** will cause a film of bubble solution to be formed across each bubble ring **110**, **112**.

FIGS. **4–6** and **8–11** illustrate the link system that operatively couples the push button **66** to the bubble rings **110**, **112**. The link system includes the push button **66**, the locking piece **96**, the locking rack **98**, a control bar **130**, a generally U-shaped pivoting bar **132**, and a ring support **134** and **136** for each respective bubble ring **110** and **112**, respectively. The link system causes the bubble rings **110**, **112** to move between the opened and closed positions when the push button **66** is pressed and released, respectively. The pivoting bar **132**, the ring supports **134** and **136**, and the rings **110**, **112** are positioned outside the housing **22**, while the control bar **130** is positioned partially outside the housing **22**.

Referring to FIG. **6**, the U-shaped pivoting bar **132** has a central section **142** that has an opening **144** through which the motor **50** can extend. A curved upper section **146** extends from one end of the central section **142**, and a curved lower section **148** extends from one end of the central section **142**. The control bar **130** is a straight bar that extends from a

location along the upper section **146**. The control bar **130** has a groove **150** through which the curved bar **88** of the push button **66** extends. An upper U-shaped prong **156** extends from the top end of the upper section **146**, the upper U-shaped prong **156** having a first leg **158** and a second leg **160**. Each leg **158** and **160** has a rounded end that has a corresponding elongated opening **162** and **164**, respectively. Similarly, a lower U-shaped prong **166** extends from the bottom end of the lower section **148**, the lower U-shaped prong **166** having a first leg **168** and a second leg **170**. Each leg **168** and **170** has a rounded end that has a corresponding elongated opening **172** and **174**, respectively.

As best seen in FIGS. **3** and **6**, the ring supports **134** and **136** are elongated shafts that are positioned adjacent and parallel to each other along their inner sides. The ring **110** is attached to the center of, and along the outer side of, the ring support **134**. Similarly, the ring **112** is attached to the center of, and along the outer side of, the ring support **136**. Thus, the two rings **110**, **112** extend away from the ring supports **134**, **136**, but are essentially positioned side-by-side to each other so that one ring **110** can be pivoted to completely cover the other ring **112**, and vice versa. An upper rounded opening **188** is provided in an extension **190** that extends from the top of the ring support **134** at an orientation that is perpendicular to the ring support **134**, and a lower rounded opening **192** is provided in another extension **194** that extends from the bottom of the ring support **134** at an orientation that is perpendicular to the ring support **134**. Protrusions **196** and **198** are provided adjacent the openings **188** and **192**, respectively, in the extensions **190** and **194**, respectively, and extend towards each other in a direction parallel to the ring support **134**. Similarly, an upper rounded opening **200** is provided in an extension **202** that extends from the top of the ring support **136** at an orientation that is perpendicular to the ring support **136**, and a lower rounded opening **204** is provided in another extension **206** that extends from the bottom of the ring support **136** at an orientation that is perpendicular to the ring support **136**. Protrusions **208** and **210** are provided adjacent the openings **200** and **204**, respectively, in the extensions **202** and **206**, respectively, and extend towards each other in a direction parallel to the ring support **136**. An upper pivot shaft **216** extends through the upper openings **188** and **200** of the ring supports **134** and **136**, respectively, and a lower pivot shaft **218** extends through the lower openings **192** and **204** of the ring supports **134** and **136**, respectively, so that the two ring supports **134** and **136** can pivot with respect to each other about a pivot axis defined by the pivot shafts **216** and **218**. The pivot shafts **216** and **218** are pivotably secured to fixed locations **240** and **242**, respectively, of the housing **22**. In addition, the protrusions **196** and **208** are retained in the openings **162** and **164**, respectively, so that the upper ends of the ring supports **134** and **136** are coupled for pivoting movement with respect to the upper section **146** of the U-shaped bar **132**. Similarly, the protrusions **198** and **210** are retained in the openings **172** and **174**, respectively, so that the lower ends of the ring supports **134** and **136** are coupled for pivoting movement with respect to the lower section **148** of the U-shaped bar **132**. The protrusions **196+208**, the protrusions **198+210**, and the pivot shafts **216**, **218** experience independent circular motion with respect to each other.

Referring now to FIGS. **4–6** and **12–13**, the assembly **20** includes a pump system that functions to pump the bubble solution from the solution bottle **32** to the bubble rings **110**, **112**. The pump system includes the motor **50**, the tube **46**, the tubings **131**, **133**, a guide wall **248**, and a gear system that functions to draw bubble solution through the tube **46** and tubings **131**, **133**. The gear system includes a motor gear **250** that is rotatably coupled to a shaft **252** of the motor **50**, a gear housing plate **254**, a first gear **256**, a second gear **258**, a resilient element **260** (such as a spring), two pressure rollers **262**, **264**, and a shaft **266**. The motor gear **250** has teeth that are engaged with the teeth of the first gear **256**. The first gear **256** is rotatably coupled to the gear housing plate **254**, and has teeth that are engaged with the teeth of the second gear **258**. The second gear **258** rotates about an axis defined by the shaft **266**, and the resilient element **260** is carried on the shaft **266** between the second gear **258** and an enlarged end of the shaft **266**. The pressure rollers **262**, **264** are spaced apart along the outer periphery of the second gear **258** and positioned to face away from the gear housing plate **254**. Referring also to FIGS. **12** and **13**, each pressure roller **262**, **264** has a base section **280** and an upper section **282** which has a smaller diameter than the diameter of the base section **280**. The gear housing plate **254** has an opening **268** along one side through which a guide element **270**, (e.g., a screw) is fitted. The second gear **258** is positioned adjacent the push button **66**, with a portion of the stepped extension **76** of the push button **66** extending into the path of the tube **46** between the second gear **258** and the gear housing plate **254** (see FIGS. **12** and **13**). In particular, the tube **46** extends from the interior of the solution bottle **32**, through the opening **44** in the solution dish **40**, into the housing **22**, and passes through a path (that is defined by the guide element **270**, the pressure rollers **262**, **264**, and the guide wall **248**) that leads to a branch **272** from where the tubings **131**, **133** extend. At the location of the guide element **270**, the pressure rollers **262**, **264**, and the guide wall **248**, the tube **46** is positioned between the second gear **258** and the guide wall **248**.

The pump system operates in the following manner. When the motor **50** is actuated, the motor gear **250** will rotate, thereby causing the first and second gears **256** and **258** to rotate as well. As the second gear **258** rotates, the pressure rollers **262**, **264** will rotate as well. As the pressure rollers **262**, **264** rotate, they will apply selected pressure on different parts of the tube **46** in the manner described below.

The assembly **20** operates in the following manner. In the normal non-operational condition (i.e., when the rings **110**, **112** are contacting each other in the closed position as shown in FIGS. **1**, **4** and **8**), the push button **66** is normally biased outwardly away from the housing **22** by the resilient element **70** (as explained above). When the user presses the push button **66** (see FIGS. **2**, **5** and **9**), the push button **66** pivots clockwise about the shaft **86** (in the orientation shown in FIGS. **4** and **5**), which causes three sequences of events occur at about the same time.

First, the bubble rings **110**, **112** are moved from their closed position to their opened position. As best shown by comparing FIGS. **8** and **9**, the bar **88** of the push button **66** is pivoted in a clockwise direction so that the sliding shaft **92** is pushed upwardly within the groove **94**. The upward movement of the sliding shaft **92** pushes the locking piece **96** rearwardly along the locking rack **98** in the direction of arrow R, thereby overcoming the normal bias of the resilient element **70**. As the bar **88** is pivoted in the clockwise direction, the bar **88** pulls the control bar **130** rearwardly in the direction of arrow R because the bar **88** is seated inside the groove **150** of the control bar **130**. Rearward movement of the control bar **130** will pull the U-shaped pivoting bar **132** rearwardly in the direction of arrow R. Since the pivot axis defined by the pivot shafts **216** and **218** is fixed, rearward movement of the pivoting bar **132** will cause the ring supports **134** and **136** to pivot about the pivot axis

defined by the pivot shafts **216**, **218** when the protrusions **196**, **198**, **208**, **210** slide back and forth within the elongated openings **162**, **172**, **164**, **174**, respectively (see FIGS. **10** and **11**), so as to pivot the ring supports **134**,**136** (and their bubble rings **110**, **112**) from the closed position to the opened position, where the openings of the bubble rings **110**, **112** (and the formed films of bubble solution) will be directly facing an air generator **300**.

The back and forth sliding motion of the protrusions **196**, **198**, **208**, **210** within the elongated openings **162**, **172**, **164**, **174**, respectively, can be described as follows: when the two rings **110**, **112** contact each other in the position shown in FIG. **10**, the protrusions **196**, **198**, **208**, **210** are positioned at the inner ends of a respective elongated opening **162**, **172**, **164**, **174**. As the pivoting bar **132** causes the ring supports **134** and **136** to pivot about the pivot axis defined by the pivot shafts **216**, **218**, the rings **110**, **112** will move apart from each other. As the rings **110**, **112** move apart from each other, the protrusions **196**, **198**, **208**, **210** will slide from the inner ends to the outer ends of the respective elongated opening **162**, **172**, **164**, **174**. When the protrusions **196**, **198**, **208**, **210** reach the outer ends of the respective elongated opening **162**, **172**, **164**, **174**, the rings **110**, **112** will be about ninety degrees apart from other, and further pivoting by the ring supports **134**, **136** will cause the protrusions **196**, **198**, **208**, **210** will slide from the outer ends to the inner ends of the respective elongated opening **162**, **172**, **164**, **174**. When the protrusions **196**, **198**, **208**, **210** reach the inner ends of the respective elongated opening **162**, **172**, **164**, **174** again, the rings **110**, **112** will be about one hundred and eighty degrees apart from other, as shown in FIG. **11**.

Second, bubble solution is pumped to the bubble rings **110**, **112**. In this regard, the clockwise pivot of the push button **66** causes the second contact **60** to engage the third contact **64**, thereby forming a closed electrical circuit that will deliver power from the power source **48** to the motor **50**. The motor **50** will turn on, thereby causing the motor gear **250** to drive and rotate the first and second gears **256** and **258**. As the pressure rollers **262**, **264** on the second gear **258** rotate, they will apply selected pressure on different parts of the tube **46**. FIGS. **12** and **13** illustrate this in greater detail. FIG. **12** illustrates the relationship between the pressure rollers **262**, **264** and the tube **46** when the assembly **20** is in the normal non-operational condition (i.e., when the rings **110**, **112** are contacting each other in the closed position as shown in FIGS. **1**, **4** and **8**), and FIG. **13** illustrates the relationship between the pressure rollers **262**, **264** and the tube **46** when the assembly **20** is in the bubble-generating position (i.e., when the rings **110**, **112** are side-by-side in the opened position as shown in FIGS. **2**, **5** and **9**). As shown in FIG. **12**, the tube **46** is normally fitted between the smaller-diameter upper section **282** of the pressure rollers **262**, **264** and the guide wall **248**, and the lower edge **78** of the stepped extension **76** of the push button **66** is fitted between the second gear **258** and the gear housing plate **254**. The resilient element **260** normally biases the second gear **258** towards the gear housing plate **254**. When the push button **66** is pressed and pivoted, the stepped extension **76** is pressed inside the space between the second gear **258** and the gear housing plate **254**, overcoming the normal bias of the resilient element **260** and causing the second gear **258** to slide along the angled edge **82** to increase the distance between the second gear **258** and the gear housing plate **254**. As the second gear **258** moves away from the gear housing plate **254** towards the guide wall **248**, the pressure rollers **262**, **264** are pushed into the tube **46** so that the tube **46** is now positioned between the guide wall **248** and the larger-diameter base section **280** of the pressure rollers **262**, **264**, thereby compressing the tube **46** as shown in FIG. **13**. Thus, rotation of the pressure rollers **262**, **264** will compress different portions of the tube **46**, thereby creating air pressure to draw the bubble solution from the interior of the solution bottle **32** through the tube **46**, on to the tubings **131** and **133**, and then into the chambers **118** of the bubble rings **110**, **112**, where the bubble solution will bleed out through the outlets **124** on to the front surfaces **126** of the bubble rings **110**, **112**.

This arrangement and structure of the pressure rollers **262**, **264** is effective in prolonging the useful life of the tube **46** and the pump system. In particular, the pressure rollers **262**, **264** only apply pressure against the tube **46** when the push button **66** is actuated (i.e., the larger-diameter base section **280** only compresses the tube **46** when the push button **66** is pressed), so that the tube **46** does not experience any pressure when the push button **66** is not actuated (i.e., the smaller-diameter upper section **282** is positioned adjacent to, but does not compress, the tube **46** when the push button **66** is not pressed). This is to be contrasted with conventional pump systems used for pumping bubble solution to a bubble producing device, where pressure is always applied to the tube regardless of whether the trigger or button is actuated. Over a long period of time, this constant pressure will deform the tube, making it difficult for bubble solution to be drawn through the tube.

Third, the air generator **300** (such as a fan which extends outside the housing **22**) that is secured to the motor **50** is actuated when the motor **50** is turned on. In this regard, the clockwise pivot of the push button **66** causes the second contact **60** to engage the third contact **64**, thereby forming a closed electrical circuit that will deliver power from the power source **48** to the motor **50** to rotate the air generator **300**. The air generator **300** blows a stream of air towards the bubble rings **110**, **112**. This stream of air will then travel through the film of bubble solution that have been formed over the bubble rings **110**, **112**, thereby creating bubbles.

Thus, pressing the push button **66** will actuate the air generator **300**, and will cause the bubble rings **110**, **112** to be positioned side-by-side to face the air generator **300** so that bubbles can be created. Pressing the push button **66** will also pump bubble solution from the solution bottle **32** to the bubble rings **110**, **112**.

When the user releases his or her pressing grip on the push button **66**, the resilient element **70** will normally bias the locking piece **96** towards the front end **100** of the locking rack **98**, thereby pivoting the push button **66** in a counter-clockwise direction (as viewed from the orientation of FIGS. **4** and **5**) about the pivot shaft **86**, biasing the push button **66** outwardly away from the housing **22**. This will cause the second contact **60** carried on the push button **66** to be biased away from the third contact **64** so that power to the motor **50** is cut. As a result, the air generator **300** will stop producing streams of air, and the pump system will stop drawing bubble solution from the solution bottle **32** to the bubble rings **110**, **112**. In addition, the bar **88** will push the control bar **130** in a forward direction (opposite to the direction of arrow R), thereby pushing the U-shaped pivoting bar **132** forwardly as well. Since the pivot axis defined by the pivot shafts **216** and **218** are fixed, forward movement of the pivoting bar **132** will cause the ring supports **134** and **136** to pivot about the pivot axes defined by the protrusions **196**+**198** and **208**+**210** (in a reverse manner from that described above for the back and forth motion of the protrusions **196**, **198**, **208**, **210** within the elongated openings **162**, **172**, **164**, **174**, respectively), so as to pivot the ring supports **134**, **136**

(and their bubble rings **110**, **112**) from the opened position of FIGS. **2**, **5** and **9** to the closed position of FIGS. **1**, **4** and **8**.

In addition, as best shown in FIGS. **4** and **5**, the solution dish **40** is positioned directly below the bubble rings **110**, **112** to collect any stray droplets of bubble solution that drip from the bubble rings **110**, **112**. These stray droplets can flow back into the solution bottle **32** via the opening **42**. In addition, the solution bottle **32** can be removed from the housing **22** by threadably disengaging the neck of the solution bottle **32** from the connecting section **34**.

FIG. **14** illustrates another bubble generating assembly **20***a* according to the present invention. The assembly **20***a* differs from the assembly **20** of FIGS. **1–13** in that two sets of two bubble rings **110***a*+**110***b* and **112***a*+**112***b* are provided instead of just two bubble rings **110**, **112**. For this reason, most of the elements in the assembly **20***a* of FIG. **14** are identical to the same elements in the assembly **20** of FIGS. **1–13**, and will not be described herein. The elements in the assemblies **20** and **20***a* that are identical will be designated by the same numeral designations, except that an "a" will be added to the designations in FIG. **14**. The following description will only highlight the differences between the assemblies **20** and **20***a*.

The assembly **20***a* differs from the assembly **20** of FIGS. **1–13** in that two sets of two bubble rings **110***a*+**110***b* and **112***a*+**112***b* are provided instead of just two bubble rings **110**, **112**. To facilitate this modification, two motors **50***a* and **50***b* are provided and are retained inside the opening **144***a* (which is now elongated to accomodate the two motors **50***a*, **50***b*) in the pivoting bar **132***a*. In addition to the wires **52***a* and **56***a* (which are the same as the wires **52** and **56** in FIGS. **1–13**), an additional wire **320** couples the two motors **50***a* and **50***b*. Each motor **50***a* and **50***b* carries a separate air generator **300***a* and **300***b*, respectively. Each ring support **134***a* and **136***a* now carries two bubble rings **110***a*+**110***b* and **112***a*+**112***b*, respectively. The bubble rings **110***a* and **110***b* are both attached to the outer side of the ring support **134***a*, and are spaced apart by a delivery tube **322**. Each opposing end of the delivery tube **322** can be connected to a peripheral opening in the annular base piece (e.g., **114**) of a separate bubble ring **110***a* and **110***b*. As a result, the bubble solution that has entered the annular chamber (e.g., **118**) of the upper bubble ring **110***a* can flow through the delivery tube **322** into the annular chamber (e.g., **118**) of the lower bubble ring **110***b*. Similarly, the bubble rings **112***a* and **112***b* are both attached to the outer side of the ring support **136***a*, and are spaced apart by another delivery tube **324**. Each opposing end of the delivery tube **324** can be connected to a peripheral opening in the annular base piece (e.g., **114**) of a separate bubble ring **112***a* and **112***b*. As a result, the bubble solution that has entered the annular chamber (e.g., **118**) of the upper bubble ring **112***a* can flow through the delivery tube **324** into the annular chamber (e.g., **118**) of the lower bubble ring **112***b*.

The assembly **20***a* operates in the same manner as the assembly **20**. The only difference is that the additional bubble rings **110***b*, **112***b* will generate more bubbles.

While the description above refers to particular embodiments of the present invention, it will be understood that many modifications may be made without departing from the spirit thereof. The accompanying claims are intended to cover such modifications as would fall within the true scope and spirit of the present invention.

What is claimed is:

1. A bubble generating assembly comprising:

a housing;

a container coupled to the housing and retaining bubble solution, the container having an interior;

a trigger mechanism;

a pair of bubble generating rings, each ring having a cylindrical configuration and a front surface, with the rings pivotably coupled to each other in a manner such that the rings can be pivoted between a closed position where the front surfaces of the rings contact each other, and an opened position where the rings are positioned side-by-side in the same plane;

a tubing that couples the interior of the container with the rings; and

a link assembly that couples the trigger mechanism and the rings in a manner in which actuation of the trigger mechanism causes the rings to be pivoted.

2. The assembly of claim **1**, wherein each ring has an interior chamber and an opening communicating with the interior chamber and through which the tubing extends, and a plurality of outlets on the front surface through which bubble solution can flow out.

3. The assembly of claim **1**, further including:

a motor operatively coupled to the trigger mechanism;

an air generator coupled to the motor and directing air towards the rings; and

a gear system coupled to the motor and applying pressure to the tubing to cause bubble solution to be delivered from the container to the rings device.

4. The assembly of claim **3**, wherein actuation of the trigger mechanism simultaneously causes (i) the air generator to direct air towards the rings, (ii) the gear system to deliver bubble solution from the container to the rings, and (iii) the rings to pivot.

5. The assembly of claim **1**, further including means for drawing bubble solution from the container, and to deliver the bubble solution to the rings.

6. The assembly of claim **5**, wherein actuation of the trigger mechanism simultaneously causes (i) the drawing means to deliver bubble solution from the container to the rings, and (ii) the rings to pivot.

7. The assembly of claim **5**, wherein the drawing means includes the trigger mechanism, at least one rotating pressure roller and a guide wall, the pressure roller having a base section and an upper section that has a smaller diameter than the base section, with the tubing positioned between the upper section of the pressure roller and the guide wall when the trigger mechanism is not actuated, and with the tubing positioned between the base section of the pressure roller and the guide wall when the trigger mechanism is actuated.

8. The assembly of claim **7**, wherein actuation of the trigger mechanism pushes the pressure roller towards the guide wall such that the tubing is moved from the upper section to the base section of the pressure roller.

9. The assembly of claim **1**, wherein the container is removably coupled to the housing.

10. The assembly of claim **1**, wherein the rings are positioned outside the housing.

11. The assembly of claim **3**, wherein the rings and the air generator are positioned outside the housing.

12. The assembly of claim **1**, further including a dish attached to the housing and positioned below the rings, with the container being removably coupled to the dish so that droplets received on the dish can flow into the container.

13. The assembly of claim **1**, wherein the trigger mechanism has a curved bar, and wherein the link system includes:

a pivoting bar that pivotally couples the rings;

a control bar coupled to the pivoting bar and the curved bar; and

a bias element coupled to the curved bar to normally bias the curved bar in a first direction, so that the control bar coupled to the curved bar, and the pivoting bar coupled to the control bar, are also biased in the first direction;

wherein actuation of the trigger mechanism overcomes the bias of the bias element and causes the curved bar, the control bar and the pivoting bar to move in a second direction that is different from the first direction.

14. The assembly of claim **13**, wherein the rings pivot about a fixed pivot axis.

15. A bubble generating assembly comprising:

a housing;

a container coupled to the housing and retaining bubble solution, the container having an interior;

a bubble generating device;

a tubing that couples the interior of the container with the bubble generating device; and

a pump system for drawing bubble solution from the container, and to deliver the bubble solution to the bubble generating device, wherein the pump system includes:

a trigger mechanism;

at least one rotating pressure roller having a base section and an upper section that has a smaller diameter than the base section; and

a guide wall;

with the tubing positioned between the upper section of the pressure roller and the guide wall when the trigger mechanism is not actuated, and with the tubing positioned between the base section of the pressure roller and the guide wall when the trigger mechanism is actuated.

16. A bubble generating assembly comprising:

a housing;

a container coupled to the housing and retaining bubble solution, the container having an interior;

a bubble generating device;

a tubing that couples the interior of the container with the bubble generating device;

a motor retained inside the housing; and

an air generator positioned outside the housing and coupled to the motor for directing air towards the bubble generating device.

17. A bubble generating assembly comprising:

a housing;

a source of bubble solution;

a bubble generating device positioned outside the housing;

a tubing that couples the source of bubble solution to the bubble generating device;

a motor retained inside the housing; and

an air generator positioned outside the housing and coupled to the motor for directing air towards the bubble generating device.

18. The assembly of claim **17**, wherein the air generator is positioned between the bubble generating device and the housing.

19. A bubble generating assembly comprising:

a housing;

a source of bubble solution;

a plurality of separate bubble generating devices; and

means for delivering bubble solution from the source of bubble solution to the bubble generating devices.

20. The assembly of claim **19**, wherein the plurality of bubble generating devices are positioned outside the housing.

21. A bubble generating assembly comprising:

a housing;

a source of bubble solution;

a bubble generating device;

means for delivering bubble solution from the source of bubble solution to the bubble generating device;

a motor retained inside the housing;

an air generator positioned outside the housing and coupled to the motor for directing air towards the bubble generating device; and

a trigger mechanism coupled to the motor and the delivering means to simultaneously activate the air generator and deliver bubble solution to the bubble generating device.

22. A bubble generating assembly comprising:

a housing;

a source of bubble solution;

a plurality of bubble generating devices;

means for delivering bubble solution from the source of bubble solution to the bubble generating devices;

a motor retained inside the housing;

an air generator coupled to the motor for directing air towards the bubble generating device; and

a trigger mechanism coupled to the motor and the delivering means to simultaneously activate the air generator and deliver bubble solution to the bubble generating devices.

23. A bubble generating assembly comprising:

a housing;

a source of bubble solution;

a plurality of separate bubble generating devices; and

a plurality of separate tubings, with each tubing coupling the source of bubble solution to a corresponding bubble generating device.

24. The assembly of claim **23**, further including a plurality of air generators, with each air generator aligned with a corresponding bubble generating device.

25. The assembly of claim **24**, further including a plurality of motors, with each motor operatively coupled to a corresponding air generator.

26. The assembly of claim **23**, wherein the source of bubble solution is a container that contains bubble solution, the container being removably attached to the housing.

27. The assembly of claim **24**, wherein the plurality of air generators are positioned outside the housing.

28. The assembly of claim **27**, wherein the plurality of bubble generating devices are positioned outside the housing, with each air generator positioned between the housing and a corresponding bubble generating device.

29. A bubble generating assembly comprising:

a housing;

a container coupled to the housing and retaining bubble solution, the container having an interior;

at least two bubble generating devices;

means for delivering bubble solution from the container to the bubble generating devices; and

a trigger mechanism coupled to the plurality of bubble generating devices such that actuation of the trigger mechanism will cause the at least two bubble generating devices to experience simultaneous pivoting movement with respect to each other.

30. A bubble generating assembly comprising:

a housing;

a source of bubble solution;

a bubble generating device positioned outside the housing;

means for delivering bubble solution from the source of bubble solution to the bubble generating device; and

a dish attached to the housing and positioned outside the housing below the bubble generating device.

* * * * *